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ABSTRACT

A description is given of the West Virginia Microcomputer Educational Network in the context of excellence in education and how it enables educators in schools, colleges/universities, and the State Department of Education to access and input to an information base of research findings, successful practices, and operational programs related to curriculum, evaluation, instruction, and teacher training, including adaptations for exceptional students. The master plan calls for the development and implementation of public school curriculum and teacher education programs based upon learning outcomes. The network provides educators with free state licensed software for word processing, electronic spreadsheets, data base management, and interactive authoring in addition to approxiately 2,000 public domain software packages. A key feature of the network is the capacity of communications between the various sites within the network. The network has the capacity to disseminate public school educational programs, teacher education programs, and training materials to every teacher and teacher educator in the state. (JD)

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USING A STATEWIDE MICROCOMPUTER EDUCATIONAL NETWORK TO ENHANCE TEACHER EDUCATION

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SECTION 1: A PERSPECTIVE ON USING TECHNOLOGY TO ENHANCE EDUCATION

Foreword

The West Virginia public school system is undergoing a major change in the focus of its educational policies, standards, and programs. As a result of attention to recent research and development efforts, landmark litigation, and statewide collaborative planning involving educators and the public at all levels, a high quality educational environment is being forged in all of West Virginia's public school classrooms.

Because of the Master Plan for Public Education in West Virginia (1983) and resultant implementation policies of the West Virginia Board of Education, teachers, administrators, students, and parents are developing and implementing a systematic approach to education which ensures equal educational opportunity. Moreover, technology in education has been scrutinized both as an end and as a means for improving education in West Virginia. Because of the unique potential that technology holds for improving education, its successful implementation must be supportive of these policies, comprehensive, well organized, and relevant to the needs of students, educators, and parents.

Context

In accordance with its Master Plan for Public Education, the State Board has adopted and is implementing the following policies and programs. The policies are mutually supportive and implement the responsibilities and commitment of the State Board to provide a thorough and efficient system of education as required in the West Virginia Constitution (Article XII, §2), the

School Laws of West Virginia (§18-2-5), and the comprehensive court opinion Pauley v. Bailey.

- high quality educational goals (Policy 2100)
- regulations for assuring equal educational opportunity in general, vocational, and special education programs (Policy 2510)
- a learner-outcome based curriculum for all public school programs of study (Policy 2422.01)
- an outcome-based teacher education and certification assessment program (Policy 5100)
- a state plan for technology in education
- a state staff evaluation program (Policy 5310-15)
- an on-site evaluation program to ensure implementation of high quality educational standards at the classroom, school, and county school district levels (Policies 2320; 2321; §18A-9A-22)

Other policies and programs currently under consideration or development include a program for beginning teachers, a staff incentives program, and a special education program development model.

These policies have been designed to assure high quality education through (a) classroom verification procedures by practicing teachers, (b) discrepancy assessments with research and development findings, and (c) educational alignment among public school educational programs, educational personnel development programs, and learning technology systems. In essence, the State Board has established an innovative, outcome-based educational system as its approach to ensuring excellence in education and equal educational opportunity.

In support of State Board policy initiatives and program development activities, the West Virginia Legislature has funded (a) the development of outcome-referenced tests for preparing and certifying prospective teachers, (b) the development of outcome-referenced tests for public school learning

outcomes in programs of study for early, middle, and adolescent education, (c) the installation and operation of an unprecedented statewide microcomputer educational network, (d) increases in salaries for teachers to provide high quality educational programs, and (e) instructional improvement funds to meet local needs relative to high quality standards. These funds have been instrumental in the implementation of State Board policy initiatives relative to excellence in education.

Because of these State Board and legislative initiatives and the underlying grass roots involvement of practitioners, the State of West Virginia represents an educational environment that is receptive to conducting research and development projects committed to excellence in education, intent on assuring equal educational opportunity, exemplary in approach to educational change, and capable of long standing results. Given this context, the microcomputer educational network described herein is viewed as a statewide educational delivery system for supporting, enhancing, and disseminating the knowledge, skills, and attitudes of students and educators needed to achieve educational excellence in West Virginia. Furthermore, teacher education is viewed as an essential component of a comprehensive educational system and should be supportive of the goals and direction of public education in the schools and classrooms of West Virginia.

Purpose

In West Virginia educators and the public have learned that the process of moving developmentally and collaboratively toward excellence in education results in the identification of unique educational needs -- especially when the state educational system shifts its roles from ensuring minimum standards to defining, delivering, and assuring high quality standards and programs. Hence, the primary purpose of this paper is to describe the West Virginia

Microcomputer Educational Network (WVMEN) in the general context of excellence in education and to show how it enables educators in schools, colleges/universities, and the State Department of Education to access and input to an information base of research findings, successful practices, and operational programs related to curriculum, evaluation, instruction, and teacher training, including adaptations for exceptional students.

Rationale

Improving Public School Education

There are four primary driving forces in West Virginia responding to problems and directing efforts concerning excellence in education via program development, teacher education, and technology in education. These primary driving forces are mutually supportive and interactive with their major purpose being the establishment and facilitation of a high quality educational program for all public school students in West Virginia.

First, the Master Plan for Public Education provides that all students will have the opportunity to develop to their capacity the knowledge, skills, and attitudes manifested in educational programs provided in public schools. In West Virginia the concept of educational program is operationally defined as the sum total of state and locally adopted learning outcomes expected of students enrolled in early childhood (K-4), middle childhood (5-8), and adolescent (9-12) educational programs. These three educational program levels are comprised of programs of studies (e.g., science), areas of study within the program (e.g., biology), and learning outcomes (a measurable description of the knowledge, skills, and/or attitudes a teacher expects the student to acquire as a result of instruction within an area of study).

In regard to technology, the Master Plan for Public Education provides that all students will develop to their capacity the knowledge, skills, and

attitudes related to technology, rational decision making, and creative problem solving in order to function in a high technological society. Also, the plan calls for computer education to be integrated into each program of study in general and vocational education at the early childhood, middle childhood, and adolescent educational levels of the West Virginia public school system. Moreover, the provisions for delivery systems described in the Master Plan for Public Education include the use of technological advances and electronic instruction, e.g., computer-assisted/managed instruction, as means for implementing learning outcomes within each program of study. Therefore, the Master Plan for Public Education has provided a framework for addressing within the West Virginia educational system the issues, goals, and needs of an emergent information society.

Second, the appointment in 1983 of a state task force on technology in education by the state superintendent of schools to (a) review the state of the art of microcomputer and related technology usage in education and (b) to establish programmatic and fiscal alternatives for supporting technology in education as a means for achieving the educational goals of the Master Plan for Public Education demonstrated the commitment of the West Virginia educational system to address this important phenomenon in education. The final report of this Task Force entitled Excellence in Education Through Technology (1983) has been received favorably by the State Board and is being used as a strategic planning guide to implement technology-based policies and programs in West Virginia.

Third, the State Board has provided for the installation of a statewide microcomputer educational network as an innovative delivery system that is planned to involve each school in the state. As currently operating, this educational network allows students and educators to process information independently with one microcomputer, between and among

schools and classrooms within a county school district, with other schools and classrooms throughout the state, and with a centralized software library at the West Virginia Department of Education's center for learning at Cedar Lakes, Ripley, West Virginia. Technically, the network allows students and educators to use a microcomputer at home, in school, or at other sites to process information from local and state operated software libraries. The statewide network has the capacity (a) to allow other agencies, such as institutions of higher education, to process information concerning public school programs and training activities with teachers on-the-job and (b) to facilitate the implementation of curricular outcomes in locations where staff shortages may exist. At this time there are approximately 90 sites throughout West Virginia that are implementing this network (Appendix B).

Fourth, the purpose of Policy 5100, Assuring the Quality of Learning in West Virginia Schools: Plan for Professional Development of Educational Personnel, is to continue to improve educational personnel preparation programs and to ensure that those who are licensed for employment in the public schools have achieved the skills, knowledge, and performance outcomes necessary to function as entry level members of the profession. The Initial Preparation Phase of the policy requires that before individuals can be certified they must complete a state approved preparation program consisting of (a) a pre-professional skills test with an established statewide acceptable level of proficiency; (b) a general studies component which is based on the outcomes expected of a well educated person exiting from an institution of higher education's program; (c) a criterion-referenced content specialization test that has been validated against public school roles and learning outcomes and requires the attainment of an empirically derived proficiency level in each endorsement area for which certification is requested; and (d) a professional education performance component with a standardized performance

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measurement. Also, the West Virginia Department of Education in collaboration with local school districts is implementing on-the-job staff development programs to assure the implementation of the Master Plan for Public Education and its subsequent policies, rules, and regulations.

These four driving forces for excellence in education demonstrate an exemplary and comprehensive approach to improving public education in West Virginia. Also, they form the programmatic basis that is necessary to justify in the minds of teachers and teacher educators the need for using technology systems to enhance public education and teacher education.

SECTION 2: LEARNING, TEACHING, AND TECHNOLOGY IN WEST VIRGINIA

Major Assumptions

The current educational delivery system used in the schools and classrooms of the public schools and institutions of higher education in the United States is comprised primarily of speech, text, and modelling behaviors and materials (Heuston, 1985). The current delivery system is further characterized by teacher-pupil class size ratios that severely limit attempts at individualized instruction, allocations of instructional time based upon absolute and linear assumptions, and teacher education training strategies delivered through the time-bound semester/course/credit system of higher education. Toffler (1981) points out that these characteristics, which are readily observable in today's schools and colleges/universities, are more consistent with the concepts and procedures of an industrial society rather than an information society. Heuston argues further that the traditional educational delivery system has matured. He supports his contention with statistics and data from national reports which indicate that although expenditures for education doubled between 1950 and 1975, measures of improvement decreased. The need to address public concerns about this dilemma requires dramatic increases in educational productivity such as those that were observed when the textbook was introduced as a new delivery system. Heuston emphasizes the need to invest public resources on learner productivity through computer-assisted/managed instructional delivery systems as a breakthrough in educational productivity for all students in the information age. White (1984) proposes that the use of computers in education will free individuals to identify what they want to learn, to determine when they want to learn it, to choose where they want to learn it, and to decide on how they

should learn it. Hence, the current educational delivery system developed during the industrial age, appears to have reached its peak. The following assumptions are consistent with the views of these authors and support the use of technology to increase learner productivity in an information society.

1. Technology in education should be a support to programs of study adopted by the State Board and county boards of education and implemented in West Virginia schools and classrooms.

2. The quality of education provided in any classroom is directly related to (a) the quality of teachers and (b) the efficacy of the delivery system they use to help students learn.

Decisions Already Made Concerning Technology in West Virginia

The Educational Goals of West Virginia include concepts that provide the basis for program development and implementation of technology in education. These goals were adopted by the State Board in 1983 and, when compared to the State Board's previous set of educational goals, include increased emphases in the areas of science and technology and creative problem solving needed to function successfully in a high technological society. One major implication of these goals for county school districts relates to the congruence between state and local educational goals. County school districts are reviewing their educational goals to ascertain whether or not local goals include similar concepts regarding science, technology, and creative problem-solving. Educational goals reflect the values of the public relative to what the public expects students to learn in school. Thus, in the West Virginia educational system an alignment of goals at the state and local levels facilitates efforts to implement a thorough and efficient educational system. The concept of alignment of educational goals is also relevant to institutions of higher

education that prepare teachers to function in West Virginia classrooms. According to State Board Policy 5100 concerning teacher education, programs for training teachers should be directly correlated with the educational goals and learning outcomes offered to students in county school district classrooms.

The Master Plan for Public Education includes provisions for the use of alternative electronic delivery systems to provide learning outcomes to students. For example, the definition of technology in education stated in the final report of the Task Force on Technology in Education includes microcomputers, television, video discs, video text, and combinations of these technologies. The implication of this definition for county school districts and institutions of higher education focuses on whether or not technology is being addressed as a "large" or "small" program effort. For example, merely installing stand alone microcomputers in a classroom is a small effort in comparison to a local district-wide planning process that results in the implementation of computer-based professional systems that are comprised of high quality hardware and software, graphics, audio, testing, and authoring components that provide direct, individualized instruction correlated with educational programs offered in classrooms.

The Master Plan for Public Education calls for the integration of computer education into all programs of study. This provision has significant implications. For example, what is the nature of computer education in social studies, art, music, or reading? The major implication of this decision in the Master Plan for Public Education relates to the amount of time available for instruction. Assuming that learning outcomes are discrete, then the development of learning outcomes for computer education in social studies, for instance, would increase the content to be learned in that program of study. Furthermore, if the time for instruction remains constant, existing social studies learning outcomes may suffer at the expense of computer education

learning outcomes or vice versa. Moreover, it may not be possible to achieve both sets of learning outcomes within the standardized, linear time allotment for social studies while maintaining the discrete integrity of each learning outcome. These issues apply to all of the other programs of study, also.

The final report of the West Virginia Task Force on Technology in Education entitled Ensuring Excellence in Education Through Technology supports the decisions mentioned above and provides implementation objectives to address them. The major implication of the Task Force plan for county school districts and teacher training institutions relates to whether or not these organizations have developed comprehensive plans for implementing technology in a way that is consistent with an information society versus an industrial society.

The West Virginia Microcomputer Educational Network (WVMEN) provides a statewide delivery system for the following purposes.

1. Teaching students and educators word processing, electronic spreadsheet, data base management, and authoring learning outcomes. These skills can be applied in any program of study for information processing, problem solving, or teaching purposes.

2. An educational bulletin board for communication purposes between and among county school districts, schools, classrooms, and homes within the state. For example, the bulletin board can be used for communicating the current status of legislative proposals, curricular materials such as learning outcomes, research and development findings, and the agenda of statewide meetings such as the West Virginia Conference for Leaders of Learning.

3. A vehicle for disseminating new software packages based upon State Board approved licensing agreements to all educators in West Virginia (Appendix C).

4. A means for all educators, students, and parents to access approved programs of study.

5. A statewide installed base of open architecture hardware that may be enhanced through new educational products to provide direct instruction to students based upon state and county boards of education programs of study.

In 1985 the West Virginia legislature approved additional funds for expanding the network to all high schools in West Virginia. At this time an implication of this planning goal for county school districts, institutions of higher education, and the state is whether or not hardware and software can be purchased with local funds to supplement state efforts thereby assisting all schools and teacher training institutions to access the network.

At this time computer programming is an elective area of study that must be offered based upon student need and interest in Phase III of the implementation of the Master Plan for Public Education. During the design of the WVMEN it was noted that the majority of students would not become the computer programmers of the future. Considerable data on the national level support this position. In this context, computer programming may be developed and implemented to meet local needs in West Virginia schools.

Discussions have begun this year as to who is qualified to teach computer programming at the local level and how they should be trained. Presently, the qualification issue is clearly a local prerogative and, thus, the qualifications for being assigned as a teacher to provide computer programming instruction must be addressed by county boards of education. No approved teacher education programs and certification requirements exist at the state level for teaching computer programming. Some educators have reacted that if state certification criteria were developed and approved, an immediate computer programming teacher shortage would exist. This reaction is based upon the traditional assumption that teachers must attain their competencies

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through college/university approved programs which are primarily based upon the completion of semester hours even though they may be outcome-based within the constraints of a course/semester driven administrative structure. An alternative to this dilemma would be to change the role of higher education in these cases to one of conducting job-related assessments of indivduals desiring to teach computer programming. Based upon these assessments, certification credentials might be awarded or training programs could be designed and delivered locally through computer-based training programs to meet staffing needs. A conceptual paper addressing this alternative approach was developed by 10 member states of the National Council of States on Inservice Education (1981) as a way of preparing for projected staffing problems.

Decisions to be Made and Questions and Issues to be Addressed

1. How will the learning outcomes for computer education called for by Policy 2510 be developed? What new issues will their development create? For example, what equipment and time will be needed to teach and learn computer education learning outcomes? To establish a data base on this issue, the State Board conducted a feasibility study concerning the implementation of computer education programs in the 1985-86 school year. A three-year implementation plan was recommended as a result of the study because of the personnel, equipment, and training needs that were identified.

2. What will be the nature of teaching strategies that will be needed by teachers to implement computer education learning outcomes? Will new learning outcomes require us to "invent" new teaching strategies concerning computer education? Will conventional strategies suffice to teach computer education?

3. Given learning outcomes for computer education, how should county school districts and school staff go about planning for the successful

implementation of computer education at the local level? Since technology is an expensive effort, cost effective strategies for meeting student needs in computer education should be implemented.

4. Will the use of technology for instruction cause us to rethink the daily delivery system used in schools? For example, given the highly adaptive and flexible nature of computers to meet individual needs, how will conventional schedules, blocks of times, material utilization, teacher assignment, and the use of academic learning time be affected to ensure success? In other words, can technology be implemented successfully in a traditional school setting? Interestingly, the characteristics of this issue have been identified relative to the learning and teaching of keyboarding skills. First grade students have been observed keyboarding data into microcomputers at the rate of 20-30 correct words per minute. They learned to do this via a self-instructional software program on a microcomputer versus via a conventional course which requires a block of time, a teacher, and a minimum number of students per course to be funded. In contrast, "turf" problems are beginning to emerge over which certificated teachers, e.g., vocational, early childhood, or specialists, should teach keyboarding to first grade students. This dilemma demonstrates the need to practice new strategies when dealing with innovation and not to apply conventional means when clearly there are new and effective ways of doing something.

5. What do institutions of higher education need to be doing at this time to prepare teachers to be ready for entry into schools which have or are planning to operate computer education programs?

6. Given the dynamics of technology, what criteria should be used for selecting microcomputers, educational software, and other electronic learning/teaching systems to deliver learning outcomes in all programs of study?

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7. How will the current role of the teacher be affected by technology? For example, do teachers need new skills to operate hardware and manage software disks or, assuming technology provides assistance in basic instruction, do teachers need new skills to teach higher order learning outcomes and to individualize instruction based upon learning profiles provided by computer-managed instruction?

Direction of Technology in Education

In West Virginia the direction of technology has been structured primarily through the report of the Task Force on Technology. A series of implementation objectives in this report provide the direction for the state, county school districts, and institutions of higher education. These areas are (a) general considerations, (b) curriculum, (c) instruction, (d) organization development, (e) educational personnel development, (f) software and hardware, and (g) management information systems. This document provides criteria and a sequence that county school districts, institutions of higher education, and the Department of Education can use in developing their computer education programs.

A statewide leadership technology training program has been initiated. This leadership program was a major implementation objective in the task force report. At this time the chief instructional leaders of the county school districts and the academic deans of institutions of higher education have been trained and plans are to provide additional training to chief educational personnel preparation officers and state education agency leadership staff. Also, there is a considerable amount of training available for teachers concerning the WVMEN in statewide conferences, summer workshops, and through job-embedded staff development programs.

SECTION 3: A PROTOTYPE MODEL FOR ENHANCING TEACHER EDUCATION

Significance

The prototype model described herein has local, state, national, and international significance because it was designed to develop and field test a comprehensive, technology-driven educational program development and technical assistance strategy for enhancing teacher education, thereby improving the quality of individuals responsible for delivering education.

The issues and problems of a perceived faltering educational delivery system in the states have been on the front pages of the nation's leading newspapers. Numerous national reports have identified broad recommendations for improving the state systems. Also, excellence in education has been a priority agenda item of governors and state and local boards of education for the past three years. However, operational and practical solutions for implementing excellence in education and, thus, creating significant and robust educational growth have been sparse. Primarily this phenomenon has occurred because responses have been limited to creating change within the limits of the current educational delivery system, e.g., add credits, extend the school day, increase teacher training to five-year programs. In response to the lack of alternatives, this prototype model addresses through a carefully coordinated plan the needs of (a) state and local relationships in a context of excellence, (b) equal educational opportunity, (c) outcome-based public school and teacher education curriculum, (d) innovative teacher training, and (e) technology in education. The successful implementation of this prototype model will provide to the local, state, national, and international communities a technology-based solution comprised of the following characteristics.

1. A process and operational data base of educational resources for correlating research-based instructional strategies and media with learning outcomes for all public school programs of study.

2. A process and operational data base of educational resources for correlating research-based teacher education and staff development training strategies needed to prepare teachers to deliver high quality educational programs.

3. A collaborative planning model for local school districts, institutions of higher education, state departments of education, the U. S. Department of Education, and countries involved in the International Council on Education for teaching (ICET) World Assembly to consider when engaged in educational program and personnel development and technical assistance relating to excellence in education.

4. A national and, potentially, an international data base accessible via microcomputer and telephone modem, for high quality educational programs that are educationally aligned within and across public school education and teacher education.

Expected Outcome

As a result of designing, developing, and implementing the prototype model described herein, educators in West Virginia public schools, colleges/universities, and the West Virginia Department of Education will be able to access, through a statewide microcomputer educational network (a) classroom verified learning outcomes, (b) research-based instructional strategies, (c) criterion-referenced test items, and (d) teacher education training strategies which have been correlated and aligned to ensure high quality educational programs. For other states, the U. S. Department of Education, and ICET, the

prototype model will be available as an operational resource, available via telephone modem and microcomputer, as they attempt to implement excellence in education.

Specifications of the Prototype Model

The following specifications are necessary to make the prototype model operational. These specifications assume that a learning outcome based curriculum and a statewide educational microcomputer network exist as prerequisite components of the prototype model.

Implementation Objectives. The successful completion of these implementation objectives will ensure that the essential components of the prototype model become operational. Each of these objectives is currently being field-tested in West Virginia.

1. Identify, design, and/or develop teaching strategies, content, and media/resources necessary to teach state and local board adopted high quality learning outcomes to students in early, middle, and adolescent education.

Learning outcomes for programs of study were developed, verified in classrooms, and adopted by the State Board in July 1984 and July 1985. As a result of new legislative funding criterion-referenced test items are being developed for these programs of study. The other components of high quality educational programs to be developed at this time are instructional systems, verified through research and development procedures, and which are necessary to implement the learning outcomes efficiently and effectively. The completion of this objective results in instructional systems gleaned from teacher effectiveness research and development findings and determined to be the most appropriate for teachers to use in teaching these learning outcomes to all classroom students at appropriate grade and student developmental levels.

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2. Determine the teacher education training strategies necessary for preparing individuals with the teaching strategies and media/resources deemed necessary in objective number 1.

Given the verified learning outcomes and instructional systems yielded by the achievement of objective one, the completion of this objective results in training strategies gleaned from research and development findings in teacher education and determined to be the most appropriate to prepare preservice and inservice teachers in the instructional strategies, content, and media/resources necessary to implement the results of objective one.

3. Field test the instructional systems and teacher education training systems yielded by the completion of objectives 1 and 2 with a sample of teachers and teacher educators representing the early, middle, and adolescent educational levels through a collaborative project comprised of county school district(s), institution(s) of higher education, and the West Virginia Department of Education.

Using a clinical supervision model, practicing teachers, and teacher educators would implement the results of objectives one and two in actual classroom teaching situations. Observational and interview data would be collected to document the efficacy of the instructional and teacher education systems.

4. Disseminate the results of the project via the West Virginia Microcomputer Educational Network (WVMEN) in order that all educators at the state, local, and college/university levels may access the results of these field-based projects.

The results of these projects would be translated into the necessary software protocols for inclusion on the statewide microcomputer network educational bulletin board. This process would result in each classroom teacher and teacher educator in the state having immediate access to the

findings of these projects for planning daily, weekly, and/or yearly instructional and training programs, respectively.

Prototype Model Statewide Leadership Planning

West Virginia has a productive history of collaboration in attaining educational outcomes. Each of the State Board policies mentioned herein has been developed by collaborative task forces, advisory councils, and planning teams comprised of West Virginia educators representing county school districts, institutions of higher education, related educational agencies, professional organizations, and the West Virginia Department of Education. Because of these accomplishments the implementation of the prototype model should replicate the planning, development, verification, and adoption strategies used in previous successful projects and outlined below.

Planning and Development Phase. The primary purpose of this phase is to establish roles and responsibilities, to establish planning processes, and to complete development tasks. Approximately six months should be allocated to complete this phase.

1. Establish a project steering committee comprised of State Department of Education staff responsible for educational program development, educational personnel development, school effectiveness and administration, technology in education, and program accountability.

2. Identify project county school districts and institutions of higher education through recommendations solicited by the State Superintendent of Schools.

3. Identify one leadership staff person from three different state departments of education and one United States Department of Education official to be consultants/observers in the project using criteria established by the steering committee and congruent with the project objectives.

4. Identify project schools, classroom teachers, principals, local district administrators, institutions of higher education, teacher educators, and additional State Department of Education staff through recommendations of the steering committee and approved by the State Superintendent of Schools.

5. Establish a project planning committee comprised of the project steering committee and selected educators from project sites, other states, and the United States Department of Education.

6. Develop a management plan at the first meeting of the planning committee for completing the project objectives. The management plan must include specific tasks related to the design, development, and implementation of the following activities.

a. A one-week educational program development institute in which classroom teachers representing each program of study receive information on the latest research and development findings concerning instructional systems in order for the teachers to prepare during the institute the program development protocols identified in implementation objective number 1 of the prototype model.

b. A one-week professional development institute in which teacher educators representing each program of study review the results of (a) above and receive information on the latest research and development findings concerning teacher education training systems in order for the teacher educators to prepare during the institute the professional development protocols identifed in project objective number 2.

c. A one-week clinical supervision training institute for project field supervisors, classroom teachers, and project staff to learn the skills necessary to implement a self-help model comparable to the one shown in Appendix D. Also, in this institute observational instruments will be selected and individuals trained in them in the context of the self-help model

in order to produce the results of implementation objective number 3 of the prototype model during the field-testing phase of the project.

d. A plan for the daily implementation of the program and personnel development and clinical supervision protocols during the field-testing phase.

e. A one-week technology product development institute in which consultants skilled in software protocols would transfer the results of the project planning and development and field-testing phases into the educational bulletin board component of the West Virginia Microcomputer Educational Network.

Field-Testing Phase. During this phase the results of the planning and development phase are verified in public school classrooms. Approximately six to nine months should be allocated for this phase.

1. Implement the project planning committee management plan activities which must address and produce results relative to the project objectives, activities, and criteria established in the planning and development phase.

2. Conduct two additional meetings of the project planning committee to monitor the implementation of the management plan.

Evaluation/Dissemination Phase. During this phase the results of the project are determined, analyzed, and disseminated through the statewide educational microcomputer network. Approximately four to six months should be allocated for this phase.

1. Evaluate the project activities relative to the prototype model implementation objectives (see the Evaluation Plan section of this paper).

2. Develop the protocols needed to disseminate the results of the project via the West Virginia Microcomputer Educational Network (WVMEN).

3. Disseminate the project outcomes through the following vehicles.

a. To all teachers in West Virginia's 55 county school districts, to all teacher educators in approved teacher education programs, and to the 55

chief instructional leaders of West Virginia county school districts through the West Virginia Microcomputer Educational Network, and at the annual West Virginia Conference for Leaders of Learning.

b. To the 50 state directors of inservice education during the annual conference of the National Council of States on Inservice Education (NCSIE) through the West Virginia NCSIE state representative.

c. To the 50 state directors of teacher education and certification during the annual conference of the National Association of State Directors of Teacher Education and Certification (NASDTEC) through the West Virginia NASDTEC state representative.

d. To the 50 state representatives of the National Technology Leadership Project (NTLP) through the West Virginia NTLP state representative.

e. To the 50 state directors of curriculum and instruction at a national invitational conference for state leadership personnel in educational program development.

Figure 1 provides a GANTT chart of the approach needed to implement this prototype model. This approach ensures statewide commitment and broad-based vision and ownership of results. More importantly, it reduces lag time for realizing the transfer of research to policy and then to practice because it distributes the results through educational leadership personnel appointed by their chief state school officers to implement daily responsibilities for curriculum, instruction, teacher education, staff development, and technology.

Evaluation Plan

The evaluation of the prototype model implementation objectives is relatively concrete and straightward. If the prototype model as set forth in this paper is supported, funded, and implemented, the following outcomes will

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FIGURE 1
12-MONTH PROJECT PLAN OF OPERATION

PHASES / Activities	PLANNING AND DEVELOPMENT PHASE				FIELD-TESTING PHASE				EVALUATION/DISSEMINATION PHASE			
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
1. Establish project steering committee												
a. Identify project sites	1.											
b. Identify project liaisons from other states and the U. S. Department of Education	a.											
c. Identify teachers, teacher educators, and other state department staff	b.											
2. Establish project planning committee	c.											
3. Conduct first meeting of project planning committee	2.											
a. Develop project management plan	3.											
b. Design program development institute	a.											
c. Design professional development institute	b.											
d. Design clinical supervision training institute	c.											
e. Design plan for classroom field testing using clinical supervision model	d.											
f. Design technology product development institute	e.											
4. Develop institutes	f.											
5. Implement institutes		4.										
a. Program development			5.									
b. Professional development			a.									
c. Clinical supervision				b.								
d. Technology product development					c.							
6. Conduct second meeting of planning committee								d.				
7. Implement clinical supervision field-test of program development and technical assistance model						e.						
8. Collect field-testing data						7						
9. Conduct third meeting of planning committee						8						
10. Code field-testing products into NVNEN protocols							9.					
11. De-bug technology products on NVNEN								10.				
12. Conduct fourth meeting of planning committee										11.		
13. Disseminate results											12.	
												13.

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be realized and, thus, the prototype model deemed successful for West Virginia and other users of the statewide network.

For Classroom Teachers. By accessing the West Virginia Microcomputer Educational Network through a toll free number and a microcomputer at home or in school they will be able to:

1. download sample learning outcomes, learning objectives, teaching strategies, media/resources, that are research-based, field tested through this prototype model, and correlated with state and locally approved learning outcomes.

2. upload the results of their classroom efforts using prototype model developed protocols to other teachers who access the West Virginia Microcomputer Educational Network.

For Teacher Educators. By accessing the West Virginia Microcomputer Educational Network through a toll free number and a microcomputer at home, in a school, or at their institutions of higher education they will be able to:

1. download public school curricular, instructional, and evaluation systems as a basis of informing prospective teachers of high quality programs of study that are being delivered in West Virginia schools.

2. download sample training strategies that are research-based, field tested through the prototype model, and correlated with high quality public school curricula as a basis for preparing prospective teachers in institutions of higher education and during on-the-job staff development programs.

3. upload the results of their training efforts using prototype model developed protocols to other teacher educators who access the West Virginia Microcomputer Educational Network, thereby disseminating action-oriented teacher education research.

For State Department of Education Staff. By accessing the West Virginia Microcomputer Educational Network through a toll free number and a

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microcomputer at home or in the West Virginia Department of Education, they will be able to:

1. download all of the results stated above.

2. upload exemplary educational resources using prototype model developed protocols.

3. upload changes in curriculum, instruction, and professional development for public education and teacher education.

For Other States, the United States Department of Education, and ICET. By accessing the West Virginia Microcomputer through a long distance telephone number and a microcomputer they will be able to access all of the above.

Adequacy of Resources

The following resources are necessary to implement the prototype model in West Virginia. They would need to be analyzed and, if appropriate, modified in other states or countries considering replication of the prototype model.

1. Learning outcomes for public school programs of study as developed, verified, and adopted by state and local boards of education using experienced and certified practicing classroom teachers, teacher educators, and consultants of state and national reputation.

2. State Board approved program outcomes for teacher education programs and which must be demonstrated by prospective teachers in performance assessments and criterion-referenced content specialization tests. These program outcomes were developed for the State Board by National Evaluation Systems on a contract basis.

3. A statewide microcomputer educational network comprised of sites throughout West Virginia. The network may be accessed by other microcomputers in any of the 55 county school districts, 17 institutions of higher education, and the State Department of Education in West Virginia using compatible

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communications software. The State Board has directed over five million dollars to the installation and current operation of this network in West Virginia.

4. The necessary work days of staff needed to carry out the project objectives.

5. The policy framework that has already been established and is being implemented by the State Board, the West Virginia Department of Education, and thousands of educators in West Virginia.

These resources provide a comprehensive context and support base for carrying out the program development and technical assistance work that is needed to establish a key component of the statewide educational system for achieving excellence in education in West Virginia. The partnership achieved through this prototype model among educators at the state, national, and local levels will be an exemplary model for others to use in the United States as a means for solving problems and issues related to high quality education.

AFTERWORD

The emergent information society raises new issues concerning education. Toffler (1981) states that "Education, everyone agrees, is central to development. But what kind of education" (p. 346). Essentially he asks that the traditional assumptions of education be re-examined to solve tomorrow's problems. In the United States, the current public outcry for high quality education is at a crossroads in terms of implementation. The choice is between industrial society versus information society solutions. Consider the following scenario as a context for deciding if conventional solutions or ones that are technology-driven will be more responsive to the needs of students and the public.

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1. Additional high quality programs of study and graduation requirements are being added to the curricula and instructional terms of local school districts throughout the United States in response to national and state reports, e.g., increased requirements in science, math, computer education, foreign languages.

2. "Students who live with both parents, come from high-income families, the top socio-economic status quartile, have relatively highly educated parents, with both parents in the home -- these students score highest on achievement test scores.... Students who are poor, in the bottom SES quartile, live with one parent or have some other arrangement, and whose parents have little education -- these score lowest on achievement test scores" (Feistritzer, 1985, pp. 1-2).

3. By 1990 the United States will need one million new teachers to staff the schools and classrooms that are expected to deliver high quality programs to all of these students (National Commission for Excellence in Teacher Education, 1985).

What will be the implementation choices of state and local school administrators when the teacher shortage becomes a reality under these conditions? Will the public stand for sub-standard certification provisions being issued to employ and to assign untrained individuals as teachers to these classrooms? If so, will these individuals, who by definition of their teaching licensure are minimum quality, be able to cope with all types of students and be able to deliver high quality education to them? Will higher education officials continue to call for five-year teacher training programs at a time when so many teachers will be needed quickly to respond to classroom vacancies and, more importantly, to student needs? The litany of issues that can be generated in the context of these conditions is endless.

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Educators must ask themselves: Does it make sense to use conventional, industrial society solutions such as sub-standard certification and a "more is better mentality" to address these issues? The new learning technologies that have been made available in recent years such as computer adaptive testing, learner profiles, direct and differentiated instruction via high quality software and hardware, computer-managed instructional systems, and telecommunications have provided educators with new options to address this scenario in ways that do not depend on the traditional concepts of standardization, e.g., teacher-pupil ratios; centralization, e.g., consolidating schools; specialization, e.g., additive high school graduation requirements; and synchonization, e.g, all classes in a building change at the same time; that characterize the current educational delivery system. Because of the flexibility, adaptability, replication capabilities, and data-based orientation of the new learning technologies, creative solutions that are commensurate with the needs of today's students can be developed and implemented.

This paper has described one statewide attempt at using technology to enhance education. It is just a first step toward a long range goal of providing high quality programs and equal educational opprtunity in West Virginia. Other noteworthy examples include the Garland, Texas Independent School District's approach to computer-assisted/managed instruction and the State of Maryland's educational utility model (Southeastern Regional Council for Educational Improvement, 1985). According to Feistritzer, "today we deal with a new kind of child...That child's parents are different. As surroundings have changed, so have aspirations" (p. vi). Technology has expanded our capacities to think, to make decisions, and to act. These capacities should be directed toward new solutions in response to the

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difficult educational problems of the future. Nothing less than a comprehensive approach bolstered by technology will be acceptable in meeting the needs of education in an information society.

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APPENDIX A

ABSTRACT

PURPOSE: The purpose of this paper is to describe the West Virginia Microcomputer Educational Network (WVMEN) in the greater context of excellence in education and how it enables educators in schools, colleges/universities, and the State Department of Education to access and input to an information base of research findings, successful practices, and operational programs related to curriculum, evaluation, instruction, and teacher training, including adaptations for exceptional students.

RATIONALE: The Master Plan for Public Education in West Virginia calls for the development and implementation of public school curriculum and teacher education programs based upon learning outcomes. The statewide network provides a data base and computer generated technical assistance system for implementing these learning outcomes in a systematic way. Moreover, the network will enhance the alignment between and among public school curricula for general, special, and vocational education, the curricula of institutions of higher education in the training of prospective educators, and the curricula of local staff development programs.

DESCRIPTION: The statewide microcomputer educational network being installed in West Virginia is comprised currently of approximately 90 sites containing 20 IBM PC microcomputers and the Corvus Omninet Local Area Network System. Also, the State Curriculum Library at Cedar Lakes, West Virginia, is included in the statewide network. All public schools, institutions of higher education, and educational agencies can access and use the network. Approximately five million dollars have been spent to install the network in West Virginia during 1984-85. The network provides to educators free state licensed software for word processing, electronic spreadsheets, data base management, and interactive authoring in addition to approximately 2,000 public domain software packages.

A key feature of the network is the capacity of communications between the various sites within the network. This unprecedented network configuration will allow transmission of both programs and data files from the central "Library" to any or all "Sub-Libraries," the transmission from any "Sub-Library" to the central "Library" and from any "Sub-Library" to any other "Sub-Library" without an intermediate transmission to the central "Library." All of these communications can be accomplished statewide over commercial dial telephone equipment.

OUTCOMES: This implementation strategy will allow all users within the statewide network to obtain a copy of information from another site if they so desire. For example, if one teacher education institution developed a classroom management program for inclusion on the network that another site desired to implement, it could be transmitted directly between the two points. If this were a program that should be available to all sites, it could be transmitted to the central "Library" at Cedar Lakes and stored for future controlled distribution. Hence, the network has the capacity to disseminate public school educational programs and teacher education programs and training materials to every teacher and teacher trainer in the state and, thus, may impact on all public school students.

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APPENDIX B

APPENDIX B

State of West Virginia
Department of Education
Charleston
25305

ROY TRUBY
STATE SUPERINTENDENT
OF SCHOOLS

MEMORANDUM

TO: County Superintendents
County Vocational Directors
Directors of Multi-County Vocational Centers

FROM: Roy Truby, State Superintendent of Schools R.T.

DATE: September 9, 1983

After a great deal of deliberation, the State Board of Education has awarded a contract to IBM for the purchase of equipment for the proposed statewide microcomputer network. We feel this will be the best statewide network system in the country. In a memorandum to you on June 22, 1983, I asked that you withhold purchases so that county boards of education could take advantage of the price and quotations negotiated in this contract and benefit from compatibility by purchasing the same equipment that will make up the statewide network.

Provided in the contract will be approximately a 30% discount on equipment purchased as a part of the initial purchase. All hardware and software listed on Attachment A may be purchased at the prices quoted. Additionally, all professional educators in the State of West Virginia may purchase for their personal use any of the equipment and software at a 20% discount. Students will also be provided a discount through local dealer-negotiated agreements. The conditions for school systems, professional educators, and student purchases are explained in Attachment B.

The issue of compatibility with existing machines of other brands is also addressed by this proposal by utilizing the Corvus Omninet and the appropriate interfaces. A number of other vendors' equipment can be attached directly to the local area network at the designated sites with the addition of network attachment hardware (approximately $500/machine). Counties should check with the state technical coordinator (to be appointed) to assure compatibility. Telecommunications is also available as a second method of accommodating file transfer. This will allow the state to make the best use of existing equipment while increasing the communications capability among the remote sites. Seminars addressing the methods of network attachment and use are planned to accommodate those currently using different types of computers. The system being purchased is described in Attachment C.

Should you have questions concerning this matter, may I suggest that you talk with Ed Morrison (348-2348) of our Vocational Bureau.

RT:ljw

Attachments

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ATTACHMENT A

HARDWARE AND SOFTWARE REQUIREMENTS FOR REMOTE SITES

The following hardware and software items are required to set up a 20-station computer network.

Hardware

Quantity	Description	Retail Price	Department of Education Price	Extended Price
1	IBM PC with 128K memory and Asynchronous Communications Adapter and (1) 160K diskette drive	$2,484	$1,737	$ 1,737
19	IBM PCs with 128K memory and (1) 160K diskette drive	2,029	1,419	26,961
19	Monochrome Display/Printer Adapter	335	234	4,446
20	IBM Monochrome Displays	345	241	4,820
3	IBM Graphics Printers (80 cps dot matrix)	595	416	1,248
1	NEC Spinwriter Printer (35 cps letter quality)	2,290	1,724	1,724
1	Tractor Feed for Letter Quality Printer	265	231	231
1	Friction Feed for Letter Quality Printer	115	111	111
4	Printer Cables	55	38	152
1	Corvus Omninet 20 meg disk with Mirror	5,085	4,019	4,019
1	Corvus Omninet disk server	990	832	832
20	Corvus Omninet transporter cards for the IBM PC	495	396	7,920
20	IBM PC Disk Operating System Version 1.1	40	28	560
	A twisted pair wire cable is required.	*	*	*
			Hardware Total	$54,761

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Additional Requirements

A full-duplex modem will be required at each site for bi-directional communications to allow for the sending and receiving of files and software between the central and remote sites. A 300/1200 BAUD transmission modem device is recommended. The Hayes Smartmodem or equal is required to work on the Omninet.

Approximately $500 should be budgeted to acquire needed supplies to initially set up a 20-station computer network.

*Special cables are required for connecting printers or other peripherals. These cables can be custom-made by local dealers upon request.

Options

Hardware

	Retail Price	Department** of Education Price	Extended** Price
Color Display	$680	$476	$476
Color/Graphics Display Adapter	244	170	170
Printer Adapter	150	105	105
Modem - 1200 BAUD Smartmodem	669	592	592

**For these options, total systems will be provided at a 30% discount. Individual component parts will be discounted at the standard educational discount of 20%.

Software

Presently software is being evaluated, and local network licensing agreements are being negotiated.

Public domain and computer-assisted software are available and being evaluated. Recommendations will be made at the earliest possible date.

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ATTACHMENT B

To purchase additional hardware and software beyond that specified in the contract, the ordering procedures are as follows:

School Systems

Contact your local IBM representative. Also, you may contact John Harbour or Scott Robinson of the Charleston IBM office at 347-7300.

Faculty and Professional Employees

The Department of Education will appoint a technical coordinator to assist in configuring the IBM Personal Computer and completes the order authorization form. Order forms are forwarded to the IBM Branch Office for order entry. When the order is ready for shipment, the technical coordinator and the participating authorized dealer will receive notice of shipment. The technical coordinator notifies the employee of the shipment, collects payment, and provides authorization to the individual. The employee uses the authorization to obtain the product at the designated authorized dealer. The customer is subsequently invoiced by IBM.

Students

Agreements will be negotiated with authorized IBM Personal Computer dealers within the state for student purchases. Upon presentation of certification that the computer to be purchased is for student use only, the dealer will sell the units at a discounted price.

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ATTACHMENT C

The solution IBM is proposing is one they feel meets the objectives of the project as set forth in the request for proposal as well as giving the State the flexibility to grow and expand the system, ultimately implementing a statewide computer-assisted instruction system in the public schools. The proposed solution is based around the IBM Personal Computer and the Corvus Omninet local area network system. Implementing a network utilizing the preceding products will allow the State to take advantage of current technology, while positioning it to easily utilize future technological enhancements.

The Omninet system is based around the Corvus disk. With a Corvus Omninet disk server, the information on the hard disk can be made available to all Personal Computers on the local area network, thus acting as a "library" of files and programs. IBM has run several programs currently available for the IBM Personal Computer on an Omninet system. Some programs will successfully load to the Omninet disk and run problem free (within the limited scope of their investigation), such as PeachText word processing. IBM found that Corvus has made modifications to the PC's operating system (DOS 1.1) which require about 7K of memory beyond that required by an unmodified version of the operating system. This means that some programs which will run in a 128K PC not attached to Omninet could require additional memory to run in an Omninet environment. This shows that each piece of software must be individually evaluated for compatibility with a customer's specific system configuration. Testing has demonstrated that it is possible to utilize existing Personal Computer programs to build the "library" and "sub-libraries" compatible with an Omninet IBM PC system. Programs which run on the IBM Personal Computer XT (with built in hard disk storage) have a good probability of being compatible with Omninet/IBM PC. It is necessary to test a specific package for compatibility with a particular system configuration.

The Department of Education must negotiate specific terms and conditions for individual software products with the vendor of that software. It is IBM's understanding that various software vendors have plans available for education and/or large procurements. The State will contact vendors for their terms and conditions. Moreover, Corvus is working with various software vendors to make arrangements for these vendors' programs to run on Omninet. IBM will work with the Department of Education in building its instructional software libraries.

At each location there will be an Omninet disk and disk server, which will allow a "sub-library" to be set up which the local students can utilize completely free from and independent of the central "library." This fact will also allow each location to acquire any specific software that is deemed valuable in its specific environment. The Private Tutor authoring system will allow individuals to develop courses to meet their specific needs, free from intervention or help from the central "library," thus adding to their own "sub-library." Utilizing Personal Computers with 128K memory will allow larger, higher function programs to be tested or even developed at each location. This adds significant flexibility to each local area network.

In addition it should be mentioned that by installing the proposed IBM Personal Computer, the Department of Education will be able to use an ever-expanding library of educational, curriculum software. This is of particular importance as the State moves toward putting computers in all the schools. A

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great deal of software is currently available; but most importantly, many major educational publishing firms are developing integrated courseware to run on the IBM Personal Computer. This will allow the schools to utilize the Personal Computers as enhancements to instruction, not just as separate, nonrelated aids.

A key element in the IBM proposal is the capability of communications between the various sites within the network. This will be accomplished using the IBM Personal Computer Asynchronous Communications Support between IBM PC's or a similar program available from another vendor. One Personal Computer per location will be equipped with the hardware and software necessary for it to perform asynchronous communications with another similarly equipped Personal Computer. This will allow transmission of both programs and data files from the central "library" to any and all "sub-libraries," as well as the transmission from any "sub-library" to the central "library" or from any "sub-library" to any other "sub-library" without an intermediate transmission to the central "library." All the enumerated communications can be accomplished over commercial dial-up telephone equipment. This implementation will allow all users within the state-wide network to obtain a copy of information from another site if they so desire. If Fayette County developed a program Kanawha County desired to implement, it could be transmitted directly between the two points. If this were a program that should be available to all sites, it could be transmitted to the central "library" at Cedar Lakes and stored there for a future controlled distribution. (This could also be accomplished from any remote site as well.)

In essence the IBM Asynchronous program will read the information from the Omninet disk, transmit it across the phone line to another site where a similar program will receive the information, and write it to another Omninet disk.

At each remote location IBM is proposing 20 IBM Personal Computers to connect to the Omninet network and disk. By being attached to the network the PC's can share data and programs residing on the hard disk, but at the same time can be limited to accessing only certain things on that disk. This gives the teacher in the classroom an element of control over what individual classes or students might do. In fact, a teacher can even have a private area which only he or she could access, an area for grades, courses under development, and so on. With all of these capabilities, each Personal Computer will still function as if it were a stand-alone unit, thus giving the student operating experience equivalent to training on a stand-alone PC. This should allow the students to operate similar units in the business environment. If for some reason a school should want to operate a PC in a true stand-alone mode, it can be disconnected from the network and run by itself without modification.

IBM is proposing Omninet for a number of reasons. The State has an existing inventory of non-IBM microcomputers and has stated the desire to continue utilizing them in the new local networks. Corvus Omninet allows microcomputers from different vendors to share the same hard disk and other network facilities. Even though each different micro may require its own application software, it can share the same hardware storage facilities with the IBM Personal Computers, which will be the centerpiece of the new system. The flexibility of Omninet should allow future products to be added easily to the existing networks. With a limit of 64 devices on a given local network, there should be no problem adding compatible equipment to the local networks to be implemented in the schools.

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In addition, it is IBM's understanding from Corvus that they are working on various products which will enhance the capability of Omninet and which will be compatible with the State's installations. It should be reiterated that the IBM Personal Computer's open architecture allows many non-IBM devices to be attached to and work in conjunction with it. This, combined with Omninet's flexibility, should allow the State considerable latitude in adding generic equipment as time passes.

Another positive aspect of Omninet is its ease of installation. The process is a simple one, and discussions with users have verified this. In addition, the users IBM has talked to have also emphasized the ease of adding devices to the network after it has been installed. These two features make this network even more attractive in a school environment. A great deal of technical skill is not required to install the network, thus the task of installation could probably be handled by current employees of the school systems. In addition, in a school environment which will doubtless expand and change, the ease with which Omninet allows this to be accomplished can only be considered a major advantage.

In short, the combination of the IBM Personal Computer and the Corvus Omninet local area network offers an outstanding solution to the Department of Education's request for proposal. The IBM Personal Computer is a powerful, expandable microcomputer which is setting standards for the industry. The selection of peripherals and software available for the PC from IBM and other sources offers its users choice and growth. The Corvus Omninet network is a proven local area network for microcomputers which works very well in conjunction with the IBM PC.

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APPENDIX C

WEST VIRGINIA MICROCOMPUTER EDUCATIONAL NETWORK (WVMEN)

The West Virginia Department of Education is very proud to have implemented a statewide microcomputer network. Moreover, the Department of Education has entered into statewide licensing agreements for the following software to be used for educational purposes.

1. TMAKER: An integrated program with word processing, spreadsheet, data base management, files processing, and spelling checker functions. The text processing features include scroll, search and replace, copy or move for lines or columns with word processing functions including margin justification, alignment, integrated; the spreadsheet functions are accessed through the word processing features.

2. TYPING TUTOR: A package to assist in developing proper keyboarding for efficient input. This instructional program takes an individual approach to building typing speed. Progress is monitored, and drills are created to address specific learning needs. Recorded progress for up to 39 students can be stored for teacher review.

3. PRIVATE TUTOR: An authorizing package whereby any teacher may develop his/her own instructional materials without having to know any programming. This program allows a teacher to input information to prepare computer-assisted instruction and evaluation activities for students. The format includes four types of screens -- true/false, text, matching, and question. The package will keep records of students' progress and alert teachers of areas where more instruction through computer-assisted instruction may need to take place via this authoring package.

4. TIPS: A job-seeking, job-keeping skills package that evaluates students and presents TIPS to improve their chances for acquiring and maintaining employment. This package is presented in various modules for students to begin where they need the most assistance. An evaluation is done by each student to determine the modules that should be reviewed. During stages of this program, helpful TIPS are printed for the student to have as a reference. A resume is completed by the student and can be used for actual job interviews.

5. AUTOCAD: A computer-aided drafting program for use in the programs/areas of study that incorporate drafting skills. AutoCAD is a powerful program that allows drawing capabilities with easy editing features. Drawing entities such as lines, circles, arcs, traces, points, solids, shapes, and text are fully supported. This menu-driven software may have commands entered from the keyboard, by using a pointing device from a screen menu, or by a digitizing tablet. Other AutoCAD commands allow for moving and copying patterns as well as zooming to magnify or shrink images.

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APPENDIX D

AUTHORS:

Nicholas Hobar,
West Virginia Department of Education
Debra Sullivan,
Putnam County Schools

Potential: Models for Self-Help

Because of the growth and increasing sophistication of systematic observation methodologies during the past five decades and because of other advances in the theories and practices of instruction, the 1980s offer unique opportunities to explore new applications of systematic observation of instruction to achieve instructional effectiveness. Figure 1 shows a self-help model for orchestrating the concepts of instructional effectiveness, systematic observation of instruction, and developmental assistance to improve the classroom performance of teachers.

In the design and development phase of the model, a teaching plan and an assessment plan are developed that, together, define the intended means and ends of instruction and the methodology and instrumentation for collecting information to document whether or not the teaching plan is accomplished. In preparing the teaching plan, such factors as student characteristics, allocated time, and content to be learned are considered. Next, decisions are made concerning instructional effectiveness variables such as (a) teachers' verbal and nonverbal behaviors, (b) academic learning time, (c) resources, (d) instructional activities, (e) subject matter structure, and (f) intent of instruction. Figure 2 provides a model for organizing these instructional effectiveness variables. In devising the assessment plan, teachers select reliable and valid observation instruments or develop customized ones for collecting information to describe the level of implementation of the teaching plan. Because of the methodologies demanded by the various types of observation instruments to collect classroom data, teachers should identify any aids necessary to assist in the collection of information about the implementation of the teaching plan. In addition to using equipment such as audio cassette and video cassette recorders, the teacher may identify the need for and enlist the help of a facilitator to collect information about the implementation of the teaching plan. In this context a facilitator is an individual whose role is to assist the teacher in accomplishing any task within the self-help model when deemed appropriate by the teacher. It is assumed that an individual teacher should be able to carry out the phases and components of the model independently; however, the aid of a facilitator may be necessary at times to enhance the self-help process. The mutual goal of the teacher and the facilitator is to achieve a collaborative working relationship.

In the performance phase of the model, both the teaching and assessment plans are implemented. The teacher uses the instructional strategies, resources, and evaluation methodologies established in the teaching plan to accomplish the learning outcomes. The specific behaviors and strategies actually used by the teacher and the behaviors of the students are recorded according to the assessment plan. For example, a video or audio cassette recorder may be used in conjunction with a systematic observation instrument with the aid of a facilitator to collect the information. Ideally, teachers should be able to develop assessment plans that apply their own skills to perform independent data collections thereby emphasizing a very personalized and continuous approach to instructional improvement. In either case, a nonthreatening atmosphere should be achieved to enhance the collection of data which reflect an honest and noncosmetic approach by the teacher during this phase. Given an instructional improvement plan developed from the results of previous teaching episodes carried out within the context of the self-help model, teachers may also be experimenting with new behaviors during instruction to attain goals for professional growth during the performance phase.

In the assistance phase of the model, data gathered during the performance phase are analyzed and teachers become objective analyzers and interpreters of their own instruction. For example, during the analysis process, teachers may:

1. raise their consciousness of managing classroom instruction.

2. identify the presence of desirable and undesirable student and teacher behaviors in the classroom.

3. identify learner supportive and nonsupportive behaviors which are present or absent in the teaching process, and

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Figure 1. A self-help model for improving classroom instruction.

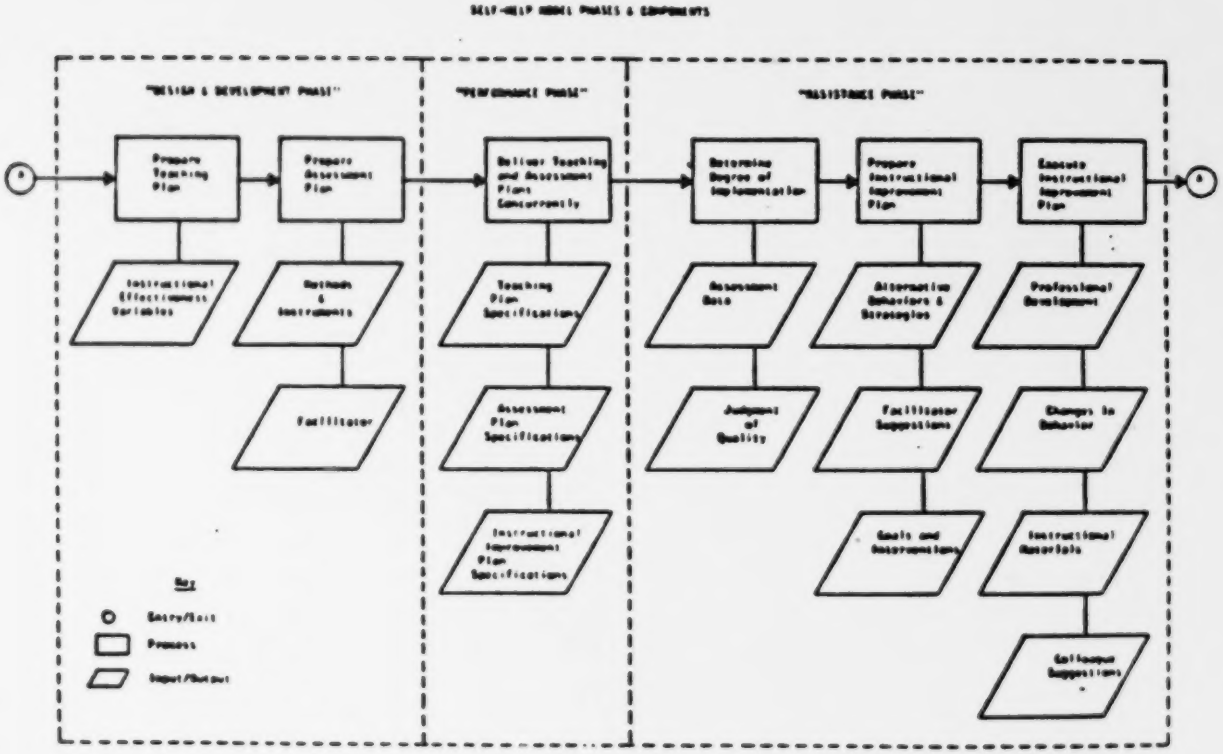

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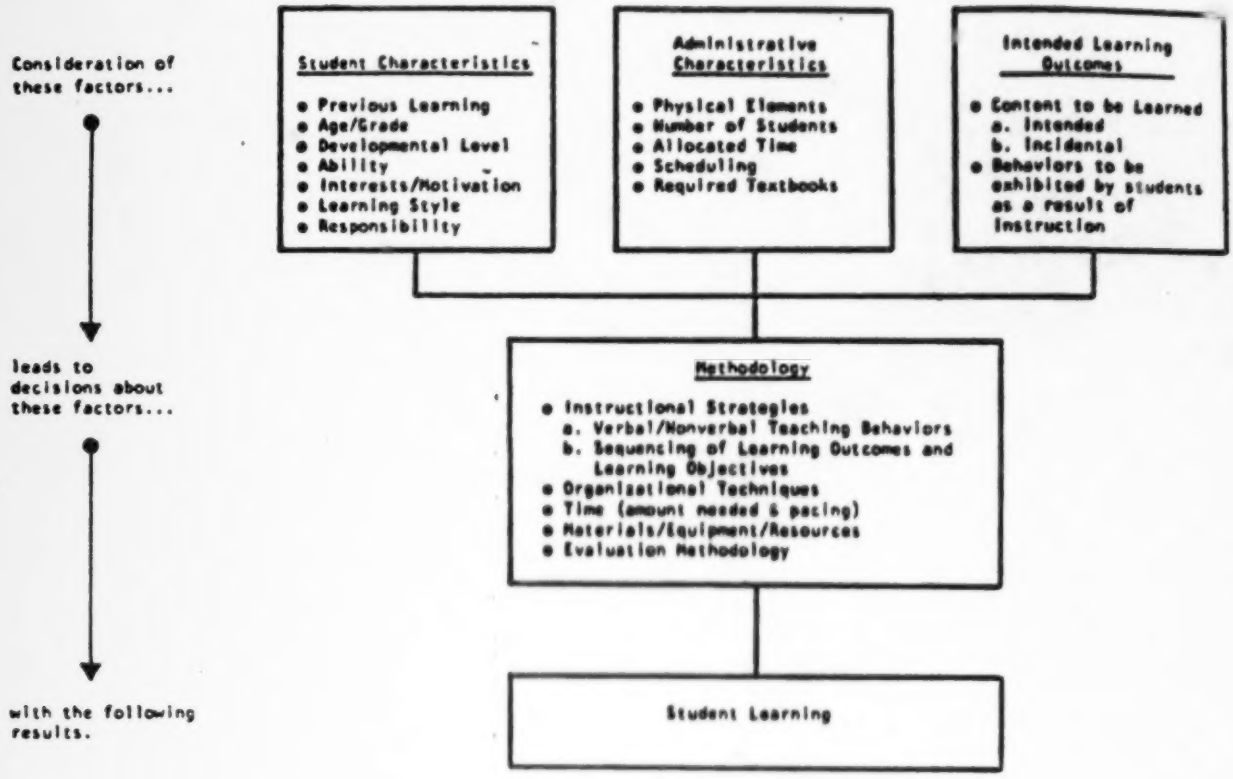
Figure 2. An instructional effectiveness model.



4. summarize information related to time on task, types of instructing behaviors used, the amount of time spent on various tasks, and use of different types of materials.

From the analysis of assessment data, teachers can themselves determine the degree to which the teaching plan, assessment plan and, in some cases, the instructional improvement plan were implemented as intended. Teachers need to be encouraged and enabled to evaluate their performance and to make decisions about the quality of teaching and the merits of their assessment and improvement plans on the basis of operationally defined criteria and strategies. If facilitators are used in this process, their role should be one of guiding the assistance phase through the use of clinical supervision behaviors such as (a) problem structuring statements and questions, (b) acceptant and clarifying statements, and (c) reinforcing statements to assist teachers in making decisions about their instructional effectiveness (Neuhard, 1970). In essence, the facilitator's goal is to help teachers to make decisions based upon objective data about their performances rather than to impose conclusions and judgments upon the teacher.

In this phase of the self-help model the teacher prepares a personal plan for instructional improvement based upon the data collected through systematic observation of instruction. In some cases the plan will be a formal written document and will be carried out over an extended period of time. In other cases, the plan will entail the decision and commitment by a teacher to use a behavior in the next class of the same or a different lesson that was observed to be absent in the previous lesson. In formulating the improvement plan, teachers should draw upon the documented results of their instructional experiences, research findings, suggestions from facilitators, and advice from colleagues. To accomplish the goals for improvement, the plan should contain (a) clear and measurable goals for improvement, (b) professional development training interventions, (c) strategies for procuring new instructional materials, (d) activities for developing new instructional materials, and (e) alternatives for instructing students.

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Theoretically, teachers should work through this cyclical self-help process in the order of the phases described above. In the reality of instructional management, however, teachers will enter the model at any phase or component. The model has been designed to accommodate this practical need of teachers. For example, a teacher may be asked to substitute in one or more classes for another teacher who has become ill suddenly and cannot teach. In this case, the teacher must engage in the performance phase without adequate time or resources to design and plan a lesson. A conventional response to this assignment, time permitting, might be to consult with teachers who are in the lounge or planning room to solicit advice on how the lesson should be taught. A teacher who has a large repertoire of teaching behaviors to draw upon because of previous experiences and accomplishments with this self-help model might follow a more systematic approach to this assignment. This teacher can manage the class in a learner supportive way and direct the students toward affective outcomes until further planning can be done concerning the cognitive aspects of the lesson. Hence, as a result of documented experience with the systematic observation of instruction in the self-help context, teachers would be able to draw upon and use effective teaching behaviors in witting and deliberate ways knowing that these behaviors have certain consequences with students.

The data base of the instructional improvement plan should be used not only for additional sensitization, awareness, and training, but also as input to the design and development of the next teaching plan and assessment plan. Interestingly, the process of analyzing one's behavior in the assistance phase and the conscious approach of engaging in validated teaching behaviors while, simultaneously, monitoring the effects of those behaviors during instruction, makes teaching a personal, yet very systematic, professional development experience for teachers. In effect, the self-help process is a job-embedded training intervention because it contains all of the ingredients of an effective training model — personalized needs assessment, systematic planning, outcomes, strategies, evaluation, and feedback. Moreover, since objective data are collected in this self-help model via systematic observation of instruction, the on-the-job experience of teachers is well documented and, thus, can be used as a data base for verifying competence, planning instruction and professional development, and strengthening the knowledge base about teaching. As microcomputers become available to teachers, the results of instruction and professional development can be stored, retrieved, and networked efficiently to enhance the self-help process between and among teachers, administrators, teacher educators, and policy makers.

The dynamic nature of the teaching-learning process may be viewed comprehensively through the implementation of this self-help model for improving classroom instruction. When teachers think and act in this manner, they reflect the behaviors of a professional educator who is systematically working toward excellence in education. In effect, the methodologies of systematic observation of instruction which have evolved over the past five decades are used in a self-help context to observe and analyze one or more of the variables which are integral parts of the instructional role of today's teachers.

EPILOGUE

Many of the concepts and procedures which have been described herein are not new. The uniqueness of the self-help model is the synthesis of the major concepts of instructional effectiveness, systematic observation of instruction, and assistance as a personalized, developmental activity. Additionally, each of these variables is addressed from a research and development perspective insofar as data exist to validate the efficacy of these variables for improving instruction, learning, and professional development. In an era characterized by public and professional demands for excellence in education, teachers should be able to communicate and improve their capabilities and results in a professional manner. The genesis, research, and applications of systematic observation of instruction have provided and will continue to provide teachers with the means to strengthen and document their roles as professional educators.

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